THE DIAGNOSIS OF MALARIA BY STAINED SPECIMENS OF BLOOD.¹

BY H. F. HEWES, M.D., BOSTON.

THESE cases of malaria with atypical symptomatology, reported by Dr. Jackson, emphasize very forcibly one point in connection with the practice of medicine, namely, the necessity of the examination of the blood as a routine practice in all conditions of disease of doubtful diagnosis; or, at all events, in all such conditions where pyrexia is present. As a rule, such an examination will be of value simply in a negative way, showing that we have no malaria, no anemia or no condition in which leucocytosis is a feature. In many cases, however, we shall come upon, expectedly or unexpectedly, some abnormal blood feature, a leucocytosis, an eosinophilia, a marked anemia, the finding of which will be of great aid in the diagnosis. And in some cases the finding of the malarial parasite or the filaria will give us an absolute diagnosis.

The utilization of this method of examination in conditions where malaria is a suspected or possible diagnosis is not at the present time as general as correct practice demands. This negligence has heretofore had some excuse. By the method of examination of a fresh specimen of blood or by the methods of examination of stained specimens which have existed up to the present, the finding of the parasite frequently, if not always, necessitated in the hands of anybody but an expert the obtaining of the specimen of blood at a period near the time of the paroxysm when the parasite (tertian) appeared in its fully developed pigmented form in the blood. This was not possible in the routine of cases.

Today, however, we have methods of staining blood which enables us to recognize the parasite at whatever stage of development it may be. I refer to the eosin-polychrome-methylene-blue staining method which Leishman has constructed by a combination of the Romanowsky stain and Jenner's method of solution in and fixation by methyl alcohol, or to the equally efficient but more complicated adaptation of the same Romanowsky method devised by Nocht. These methods, especially the former, are so simple in application as to be feasible for the busy practitioner if he have simply an elementary knowledge of staining procedures.

When stained by these methods the malarial organism, whatever its type or stage of development, always shows in its substance a dark red or purple red chromatin granule. It is this granule which serves to distinguish the blue staining intracorporeal plasmodium from any other basic staining substance which may be in the blood.

I have pictured here on the board the appearance of the malarial organism in its various phases of development as it appears in stained specimens. As you see, the organism has in all cases the following general characteristics: It appears as a

blue staining intracorporeal body, having, according to its stage of development, a spherical, or ring, or spider-like shape, and contains, if young, no pigment, if advanced, many pigment granules. In the substance of each organism, separated by a clear zone from the rest of the substances, is a red-staining granule, or a group of such granules.

A more detailed description of the appearances of the malarial organisms when stained by this method, as well as a description of the makeup of the stain and the manner of its use, will be found in Dr. Wright's article on the subject in the *Journal of Medical Research*. Dr. Wright has introduced a modification in the preparation of the stain which simplifies its manufacture over the original Leishman method.

With the possession of these accurate and simple methods of blood staining for malarial parasites,—methods which are at the same time useful for the other purposes of blood examination, the recognition of leucocytosis in its various forms, of pernicious anemia, of the granular stiffening of lead poisoning, and the anemias,—there can be in future no excuse for the failure to make diagnosis of active malaria through neglect to examine the blood, or indeed failure to get the record of the blood finding in any case of doubtful character, whatsoever its nature.

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The time of exposure depends primarily upon the intensity of the x-radiation. Our effort should be to standardize every step of treatment. If we use a coil we must know the volts and amperes and the number of interruptions per second; if a static machine, the number and diameter of the plates and the number of revolutions per minute. With these data established, we should adopt a standard intensity of x-radiation, a standard distance of the tube from the patient's skin, and a standard duration and frequency of application. Roughly speaking, he said, he selected a tube just beginning to be hard (corresponding to from five to seven inches spark-gap of the coil) giving a good photographic picture of the hand in one minute, at a distance of two feet, and giving equally clearly a good fluoroscopic outline of the skeleton of an average man at the same distance. He selected a distance of eight inches and a duration of from six to eight minutes, and gave a treatment three times a week. In this manner, where sound skin intervened, he usually got a dermatitis of a mild type in from one to two weeks. Instead of stopping treatment when this appeared, he went right on (often shifting, however, the

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